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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,464	11/12/2003	Won B. Bang	A7695/T51600	9288

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Patent Counsel
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EXAMINER

COLEMAN, WILLIAM D

ART UNIT PAPER NUMBER

2823

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/712,464

Applicant(s)

BANG ET AL.

Examiner

W. David Coleman

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7, 13, 15, 17 and 25-30 is/are allowed.
- 6) ☐ Claim(s) 22, 24 and 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed June 9, 2005 have been fully considered but they are not persuasive.
2. Applicants contend that Lee et al., U.S. Patent 5,785,796 herein known as Lee does not teach or suggest reducing the temperature of the substrate during the deposition of the dielectric layer as required by the invention of claim 1.
3. In response to Applicants contention that Lee fails to reduce the temperature of the substrate during the deposition of the dielectric layer as required by the invention of claim 1, please note the following. Because Lee teaches forming a thermal oxide (column 33, lines 28-32) for DRAM (see column 1) and the thermal oxide comprises silicon dioxide, the temperature is required to be reduced when the desired thickness of the oxide is obtained (it is well known to reduce the temperature to room temperature after forming the thermal oxide). The Examiner takes the position that it is well known that thermal oxide kinetics require a certain amount of heat (approximately 600 °C-1200 °C, see FIG. 7.4 of Ghandhi) so that oxidation of silicon takes place. The Examiner also has provided a section from Sorab K. Ghandhi, "VLSI Fabrication Principles, Silicon and Gallium arsenide", John Wiley & Sons, 1986, pp 377-383, which explains the kinetics of forming thermal oxides. It appears that once Lee reaches the desired thickness for the thermal oxide, it is inherent that the temperature is reduced in the process chamber to control and stop the growth of the silicon oxide. This step is very settle, however it is inherent and therefore meets the limitations as required by the invention of claim 1.

Art Unit: 2823

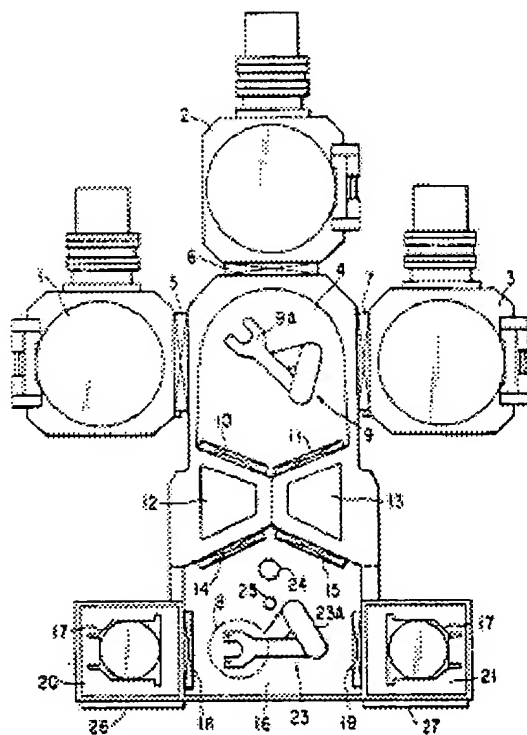
4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 5, 6, 8, 12, 15, 16, 18, 19, 20, 21, 22, 23, 24 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee, U.S. Patent 5,785,796.

Lee discloses a semiconductor process as claimed. See **FIGS. 1-24C**, where Lee teaches the following limitations.



6. Pertaining to claim 1, Lee teaches a method of operating a substrate processing chamber, the method comprising:

Art Unit: 2823

transferring a first substrate into the substrate processing chamber and heating the substrate to a first temperature of at least 510°C (please note that since Lee teaches incorporating a thermal oxide, it is well known that thermal oxides are formed at least at the claimed temperature); depositing an insulating layer over the first substrate while reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature (cleaning and etching takes place at lower temperature (column 22, line 66 and see table 1);

transferring the first substrate out of the substrate processing chamber;

removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of chamber (column 11, lines 47-50);

transferring a second substrate into the substrate processing chamber and heating the substrate to the first temperature (it is well known to fabricate more than one substrate); and depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature.

7. Pertaining to claim 5, Lee teaches the method of claim 1 wherein the insulating layer comprises silicon oxide.

8. Pertaining to claim 6, Lee teaches the method of claim 1, wherein each depositing step includes first substep of depositing an initial portion of the insulating layer over the first and second substrates, respectively, at the first temperature.

9. Pertaining to claim 8 (see the rejection as applied to claim 1), Lee teaches a method of operating a substrate processing chamber having a substrate heater, the method comprising: transferring a first substrate into the substrate processing chamber and heating the heater to a first set point that causes the substrate to be heated to a first temperature of at least 510°C; depositing an insulating layer over the first substrate while reducing the temperature of the heater to a second set point thereby reducing the temperature of the substrate from the first temperature to a second temperature that is lower than the first temperature; transferring the first substrate out of the substrate processing chamber; removing unwanted deposition material formed on interior surfaces of the chamber during the depositing step by introducing reactive halogen species into the chamber while increasing the temperature of the heater from a third set point that is lower than the first set point to a fourth set point that is lower than the first set point; transferring a second substrate into the substrate processing chamber and heating the heater to the first set point substrate to the first temperature; and depositing an insulating layer over the second substrate while reducing the temperature of the substrate from the first temperature to the second temperature.

10. Pertaining to claim 12, Lee teaches the method of claim 1 wherein the insulating layer comprises silicon oxide (column 36, lines 32-35).

Art Unit: 2823

11. Pertaining to claim 16, Lee teaches the method of claim 8 wherein each depositing step includes first substep of depositing an initial portion of the insulating layer over the first and second substrates, respectively, at the first temperature.

12. Pertaining to claims 2, 3, 4, 9, 10, 19, 20 and 21, given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

Objections

13. Claims 22 and 24 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Allowable Subject Matter

14. Claims 7, 13-15, 17 and 25-31 allowed.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

16. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2823

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 571-272-1856.

The examiner can normally be reached on Monday-Friday 9:00 AM - 5:30 PM.

18. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

19. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



W. David Coleman
Primary Examiner
Art Unit 2823

WDC